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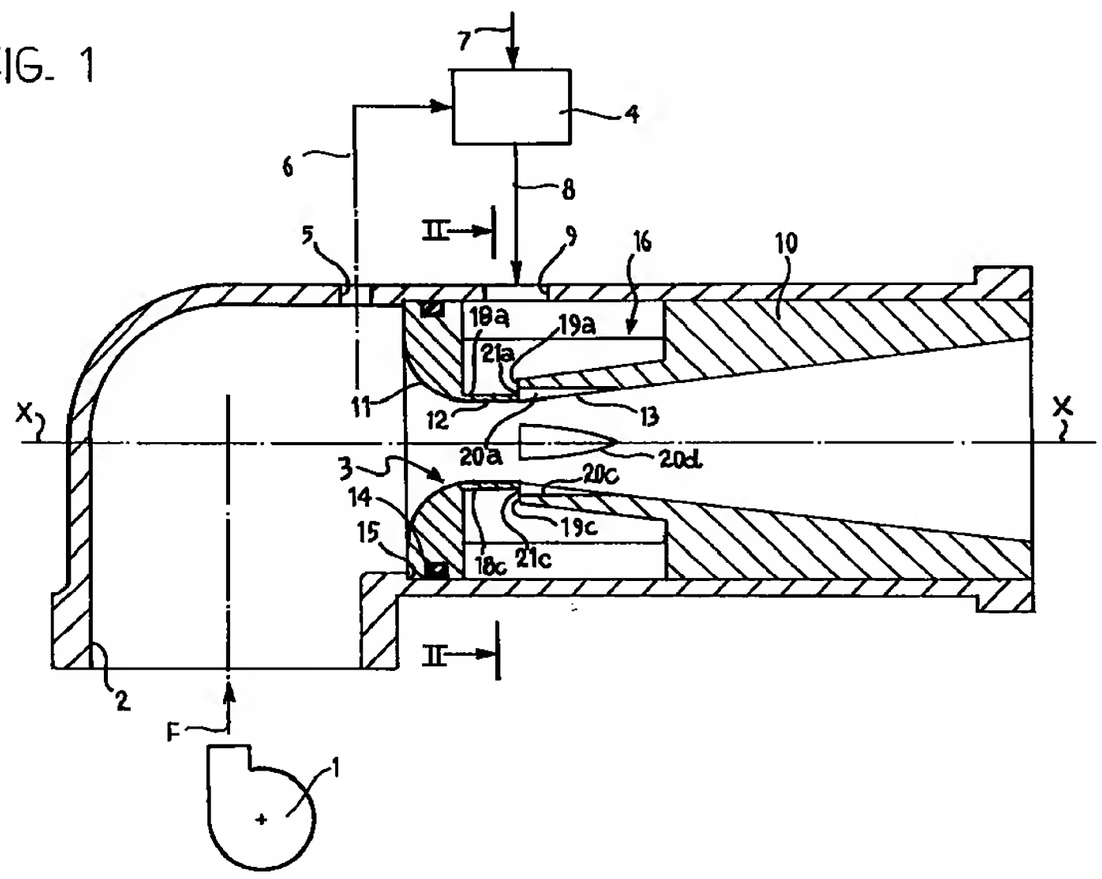
(54) An air-gas mixing device particularly for gas burners with forced ventilation

(57) An air-gas mixing device comprises a Venturi duct (3) inside which a portion (12) with a restricted cross-section is defined and outside which a gas-distribution chamber (16) is defined; gas-induction passageways (21a-d; 101a-d) open in the wall of the portion with a restricted cross-section, between the gas-distribution chamber (16) and the interior of the Venturi duct (3), and are formed in the Venturi duct with orientations having an axial component.

FIG. 1



EP 0 846 916 A2

Description

The subject of the present invention is an air-gas mixing device, particularly for gas burners with forced ventilation, of the type comprising a Venturi duct inside which a portion having a restricted cross-section is defined and outside which a gas-distribution chamber is defined, gas-induction passageways opening in the wall of the portion with the restricted cross-section, between the gas-distribution chamber and the interior of the Venturi duct.

Devices of the aforementioned type are well known commercially; they normally comprise a valve unit for supplying gas into the Venturi duct (in short the "Venturi") at a pressure controlled in dependence on the air-pressure detected therein, and a fan which is normally located downstream of the Venturi duct, into which the air and gas mixture is drawn. The location of the fan downstream of the Venturi is selected to improve the homogeneity of the air-gas mixture produced in the Venturi duct and supplied to the burner. In practice, the fan homogenizes this mixture as a result of the mixing and turbulence brought about inside it. The gas-induction passageways are normally oriented radially.

A principal problem encountered with known devices lies in the fact that they involve some structural complications in the production of the fan. Since a mixture of air and gas has to pass through it, the fan must be airtight and is normally made of metal and thus is quite expensive. On the other hand, it has been found that the positioning of the fan upstream of the Venturi, which would eliminate these problems since only air would pass through it, leads to an undesirable worsening of the degree of homogenization of the air-gas mixture supplied to the burner.

The problem upon which the invention is based is that of the provision of an air-gas mixing device, particularly for gas burners with forced ventilation, which is designed structurally and functionally so as to overcome all of the problems complained of with reference to the prior art mentioned.

This problem is solved by the invention by means of a device formed in accordance with the following claims.

The characteristics and advantages of the invention will become clearer from the detailed description of two preferred embodiments thereof, described by way of non-limiting example with reference to the appended drawings, in which:

- Figure 1 is a longitudinal section of the device of the invention, part of which is shown only schematically,
- Figure 2 is a section taken on the line II-II of Figure 1,
- Figure 3 is a longitudinal section of a variant of the device of the invention,
- Figure 4 is a section taken on the line IV-IV of Figure 3.

With reference to the drawings indicated, an air-gas mixing device, particularly for gas burners with forced ventilation, formed in accordance with the present invention, comprises a fan 1, to the output opening of which are connected a tubular duct 2, a Venturi duct 3 formed in the tubular duct 2, and a valve unit 4 for supplying gas to the Venturi 3 at a pressure controlled in dependence on the air-pressure detected in the duct 2 upstream of the Venturi.

The air-pressure is detected through a first hole 5 opening into the tubular duct 2 and indicated schematically by the arrow 6 which leads to the valve unit 4. The arrow 7 indicates the supply of gas from the external gas mains to the valve unit 4, and the arrow 8 indicates the delivery of gas, controlled by the valve unit, to a hole 9 in the tubular duct 2.

The Venturi 3 is defined by the machining of the axial duct inside a sleeve-like body 10 in the form of a double cone; it comprises a first, inlet portion 11, a second, intermediate portion 12 with a restricted cross-section, and a third, outlet portion 13. As is well known, the intermediate portion 12 with the restricted cross-section is that in which the gas passing through the Venturi has the greatest speed and the lowest pressure.

The sleeve-like body 10 is engaged sealingly in the tubular duct 2 by means of an O-ring seal 14 and is in abutment with a small shoulder 15 at the end facing towards the fan 1. In the region of the portion 12 with the restricted cross-section, it has a narrower outer portion defining, with the surface of the tubular duct 2, a gas-distribution chamber 16.

In the region of the chamber 16, the body 10 has a series of four ribs 17a, b, c, d defining the same number of recesses 18a, b, c, d, the bases of which are flat, are rectangular in plan, and form respective shoulders indicated 19a, b, c, d.

The shoulders 19a-d are arranged substantially at right angles to the axis X-X of the Venturi 3 in the region of the downstream end (with reference to the direction of the air-flow through the Venturi, indicated by the arrow F) of the portion 12 with the restricted cross-section.

A respective indentation 20a-d with a cylindrical surface having an axis substantially parallel to the axis X-X of the Venturi is formed on the internal wall of the sleeve-like body 10, that is, the wall defining the Venturi 3, for each of the shoulders 19a-d, starting from its wall. Owing to the taper of the third portion 13 of the Venturi, the cross-sections of the indentations 20a-d decrease progressively in the direction of flow F.

A slot 21a-d opening in the respective shoulder 19a-d is formed at the base of each indentation 20a-d, owing to its intersection with the corresponding recess 18a-d. The slots 21a-d define, with the respective indentations 20a-d, the same number of passageways for the induction of gas from the gas-distribution chamber 16 into the Venturi 3. The openings of the gas-induction passageways into the Venturi 3 are distributed

equiangularly.

The slots 21a-d lie in a plane perpendicular to the axis X-X of the Venturi duct 3 and, because of the positions of the indentations 20a-d, cause the orientations of the gas-induction passageways to have a predominant axial component, in contrast with the typically radial orientation of the gas-induction passageways in the curved surfaces of Venturis formed according to the prior art.

It has, however, been observed that, with the arrangement and orientation of the gas-induction passageways of the invention, an optimal air-gas mixture is achieved by virtue of the arrangement with a predominantly axial orientation, whilst these induction passageways are still located in the wall of the Venturi, without obstructing the air-flow in the duct.

Figures 3 and 4 show a variant of the device of the invention. Details similar to those of the preceding embodiment are indicated by the same reference numerals. This variant differs from the embodiment just described mainly in that, instead of being formed by the machining of a sleeve-like body, the Venturi duct 3 is produced by the manufacture of a thin-walled, double funnel-shaped body 100. The gas-induction passageways, generally indicated 101a, b, c, d are consequently formed by local deformation of the wall of the body 100 and punching of the slots 102a, b, c, d.

Amongst the advantages of the invention is the fact that, by virtue of the improved air-gas mixing, the fan can be located upstream of the mixing region, so that only air passes through it and all of the problems relating to the movement of air-gas mixtures are consequently avoided. In particular, it is possible to use structurally simpler and less expensive fans than those required for operation in the presence of gas, that is, those located downstream of the Venturi. Moreover, fans made of plastics material can be used.

Claims

1. An air-gas mixing device, particularly for gas burners with forced ventilation, comprising a Venturi duct (3), inside which a portion (12) with a restricted cross-section is defined and outside which a gas-distribution chamber (16) is defined, gas-induction passageways (21a-d; 101a-d) opening in the wall of the portion (12) with a restricted cross-section, between the gas-distribution chamber (16) and the interior of the Venturi duct (3), characterized in that the gas-induction passageways are formed in the Venturi duct (3) with orientations having an axial component.

2. A device according to Claim 1, in which the shape and orientation of the gas-induction passageways (21a-d; 101a-d) is such that the axial component is predominant.

3. A device according to Claim 2, in which a respective, axially elongate indentation (20a-d) is formed in the inside wall of the Venturi duct (3) in the region of each gas passageway (21a-d) in order to favour axial out-flow of the gas.

4. A device according to Claim 3, in which the cross-sections of the indentations (20a-d) decrease progressively in the axial direction of flow of the air-gas mixture in the duct.

5. A device according to Claim 4, in which the gas-induction passageways (21a-d) open in the indentations (20a-d) in the region of the portion which is furthest upstream, with reference to the direction of flow.

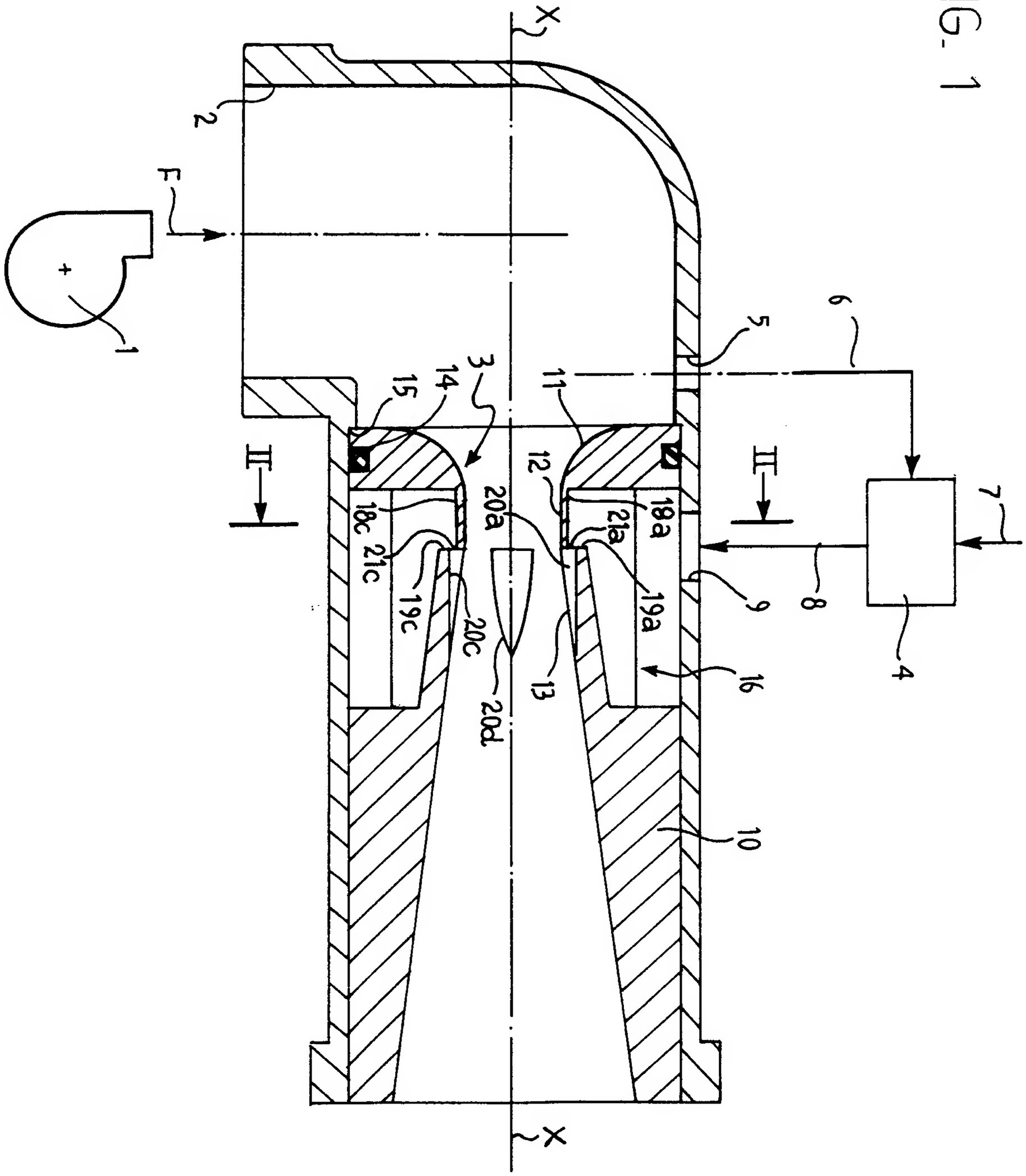
6. A device according to Claim 5, in which the ends of the indentations (20a-d) which are furthest upstream with reference the direction of flow comprise end walls substantially perpendicular to the direction of flow, the gas-induction passageways being formed in the corresponding end walls.

7. A device according to Claim 6, in which the gas-induction passageways (21a-d; 101a-d) are in the form of slots opening in the end wall.

8. A device according to one or more of the preceding claims, in which the openings of the gas-induction passageways (21a-d; 101a-d) into the Venturi duct (3) are distributed equiangularly.

9. A device according to one or more of the preceding claims, in which corresponding recesses (18a-d) are formed outside the Venturi duct (3) in the region of the gas-induction passageways (21a-d), the gas-induction passageways being produced by at least partial intersection between the indentations (20a-d) and the corresponding recesses (18a-d).

10. A device according to one or more of the preceding claims, comprising a fan (1) for forced ventilation, the fan (1) being located upstream of the Venturi duct (3) with reference to the direction of flow.


X
F
2
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14
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II
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18c
21c
19c
20c
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FIG. 1

FIG. 2

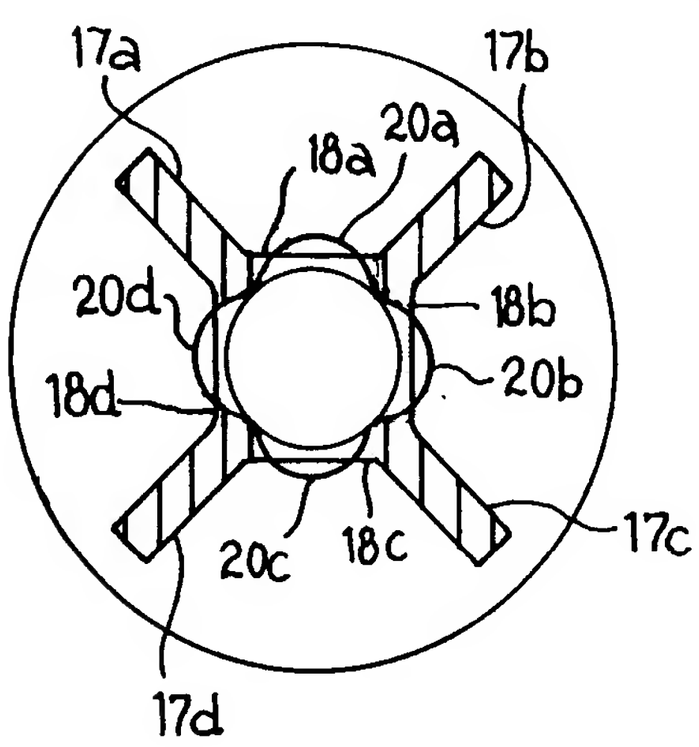


FIG. 3

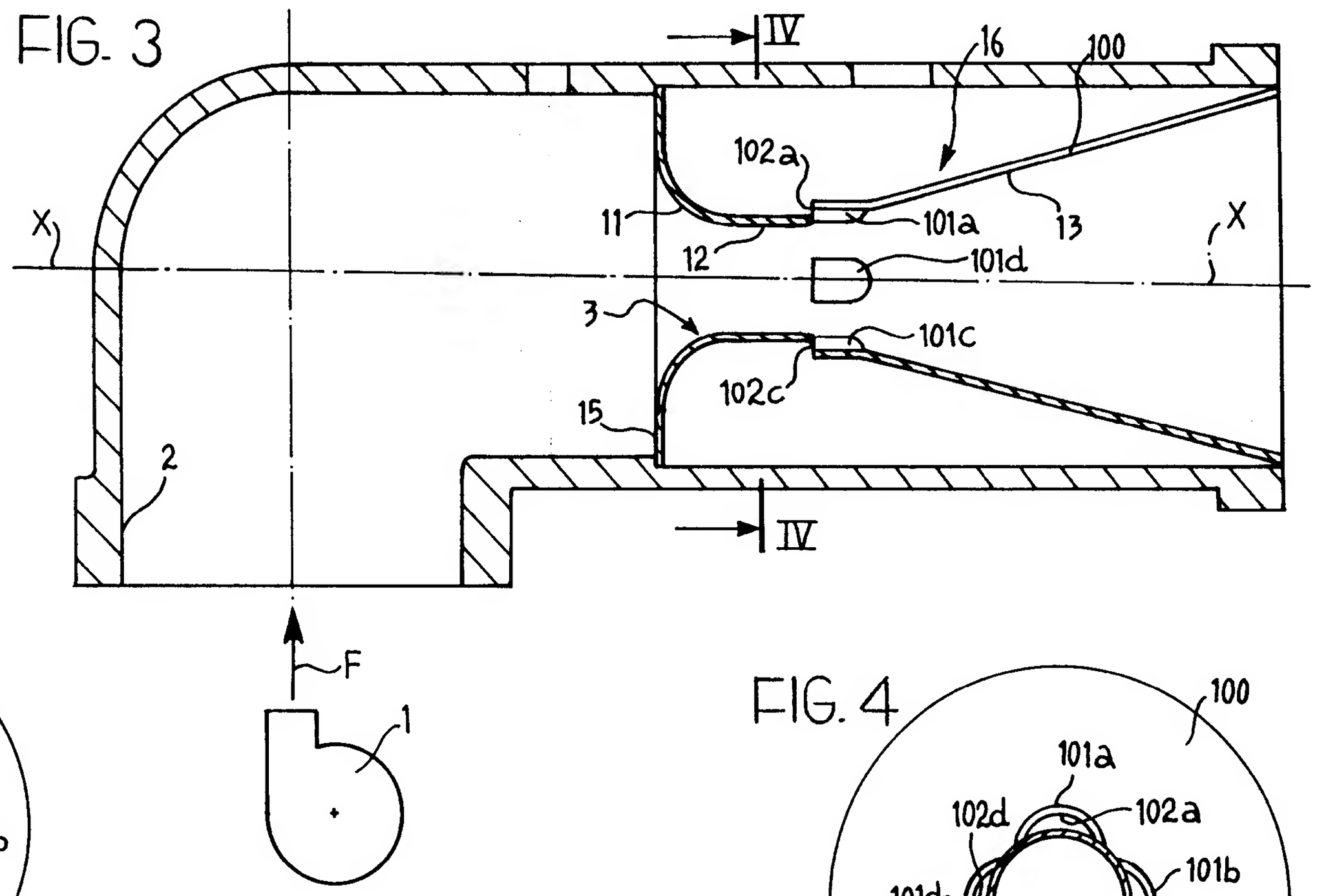
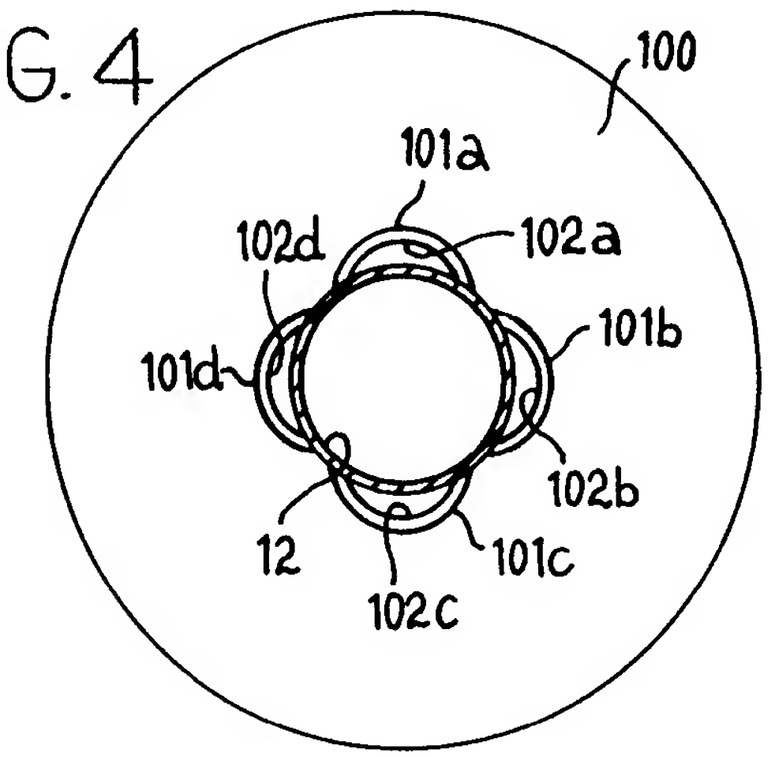


FIG. 4



DERWENT-ACC-NO: 1998-300076

DERWENT-WEEK: 200126

TITLE: Air-gas mixing device for gas burners has venturi duct inside which portion with restricted cross-section and outside gas-distribution chamber having passageways open in wall of portion with restricted cross-section

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IT 1288006 B	September 10, 1998	IT

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INT-CL-CURRENT:

TYPE	IPC DATE
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ABSTRACTED-PUB-NO: EP 846916 A2

BASIC-ABSTRACT:

The device, is provided with forced ventilation, comprising a Venturi duct (3), inside which a portion (12) with a restricted cross-section is defined and outside which a gas-distribution chamber (16) is defined. Gas-induction passageways (21a-d; 101a-d) open in the wall of the portion (12) with a restricted cross-section.

The gas-induction passageways are formed in the Venturi duct (3) with orientations having an axial component. The shape and orientation of the gas-induction passageways (21a-d; 101a-d) is such that the axial component is predominant. Respective, axially elongate indentation (20a-d) is formed in the inside wall of the Venturi duct (3) in the region of each gas passageway (21a-d) in order to favour axial out-flow of the gas.

ADVANTAGE - The fan can be located upstream of the mixing region, so that only air passes through it and all of the problems of the air-gas mixtures are consequently avoided.

CHOSEN-DRAWING: Dwg.1/5

TITLE-TERMS: AIR GAS MIX DEVICE BURNER VENTURI DUCT PORTION RESTRICT CROSS SECTION DISTRIBUTE CHAMBER PASSAGE OPEN WALL

DERWENT-CLASS: Q73

SECONDARY-ACC-NO:

Non-CPI Secondary Accession Numbers: 1998-234790